

Claims:

1. In a machine for mowing crop materials, the improvement comprising:

a cutter bed including a series of rotary cutters extending across the path of travel of the machine and rotatable about individual, upright axes,

said series of cutters including a plurality of intermediate cutters and at least two outer cutters located outwardly beyond and at opposite ends of the plurality of intermediate cutters,

said intermediate cutters including a pair of drive cutters to which driving power is supplied for all of the intermediate cutters;

at least a pair of hydraulic motors operably coupled with respective ones of said drive cutters for supplying said driving power to the drive cutters for distribution to the remaining intermediate cutters;

power distribution means operably interconnecting all of the intermediate cutters with one another in an unbroken drive line to effect said distribution of driving power from the drive cutters to the remaining intermediate cutters;

means for supplying hydraulic fluid under pressure to said motors for operating the motors; and

means operably coupling the outer cutters with the hydraulic motors for driving the outer cutters,

said means for supplying hydraulic fluid including conduit means communicating said motors with one another during the application of driving power to the drive cutters in a manner to cause the motors to share the load of driving all of the intermediate cutters and all of the outer cutters.

2. In a machine as claimed in Claim 1,
said cutter bed further including an elongated housing
located beneath the intermediate cutters,
said power distribution means being contained within
said housing.

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3. In a machine as claimed in Claim 2,
said power distribution means comprising intermeshing
gears.

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4. In a machine as claimed in Claim 3,
said means operably coupling the outer cutters with
the hydraulic motors being located exteriorly of
said housing.

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5. In a machine as claimed in Claim 4,
each of said drive cutters having input drive shaft
means operably coupling the drive cutter with its
corresponding hydraulic motor,
each of said outer cutters having driven shaft means
operably associated therewith,
said means operably coupling the outer cutters with
the hydraulic motors comprising mechanism inter-
connecting the drive shaft means and the driven
shaft means.

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6. In a machine as claimed in Claim 5,
said mechanism including an endless, flexible drive
element entrained around said drive shaft means
and said driven shaft means.

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7. In a machine as claimed in Claim 5,
said mechanism including a set of intermeshing gears.

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8. In a machine as claimed in Claim 5,
said mechanism including a gear box on each of said
drive shaft means and driven shaft means,
said mechanism further including transfer shaft means
extending between the gear boxes of a drive shaft
means and a driven shaft means.

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9. In a machine as claimed in Claim 2,
said means operably coupling the outer cutters with
the hydraulic motors being located exteriorly of
said housing.

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10. In a machine as claimed in Claim 9,
each of said drive cutters having input drive shaft
means operably coupling the drive cutter with its
corresponding hydraulic motor,
each of said outer cutters having driven shaft means
operably associated therewith,
said means operably coupling the outer cutters with
the hydraulic motors comprising mechanism inter-
connecting the drive shaft means and the driven
shaft means.

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11. In a machine as claimed in Claim 10,
said mechanism including an endless, flexible drive
element entrained around said drive shaft means
and said driven shaft means.

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12. In a machine as claimed in Claim 10,
said mechanism including a set of intermeshing gears.

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13. In a machine as claimed in Claim 10,
said mechanism including a gear box on each of said
drive shaft means and driven shaft means,

said mechanism further including transfer shaft means extending between the gear boxes of a drive shaft means and a driven shaft means.

5 14. In a machine as claimed in Claim 1,
further including means defining a crop discharge
opening behind the cutter bed for receiving crop
materials cut by the series of cutters,
said discharge opening having a pair of opposite ends,
10 said drive cutters being located adjacent said opposite ends of the discharge opening.

15 15. In a machine as claimed in Claim 14,
each of said drive cutters being provided with up-
right, input drive shaft means for receiving
driving power from the hydraulic motors,
said input drive shaft means being located outboard of
said opposite ends of the discharge opening.

20 16. In a machine as claimed in Claim 15,
each of said outer cutters being provided with up-
right, driven shaft means located outboard of the
input drive shaft means,
said means operably coupling the outer cutters with
25 the hydraulic motors including mechanism inter-
connecting the drive shaft means and the driven
shaft means.

30 17. In a machine as claimed in Claim 16,
said cutter bed further including an elongated housing
located beneath the intermediate cutters,
said power distribution means for the intermediate
cutters being contained within said housing,

said mechanism interconnecting the drive shaft means and the driven shaft means being located externally of said housing.

5 18. In a machine as claimed in Claim 16,
said mechanism including an endless, flexible drive
element entrained around said drive shaft means
and said driven shaft means.

10 19. In a machine as claimed in Claim 16,
said mechanism including a set of intermeshing gears.

15 20. In a machine as claimed in Claim 16,
said mechanism including a gear box on each of said
drive shaft means and driven shaft means,
said mechanism further including transfer shaft means
extending between the gear boxes of a drive shaft
means and a driven shaft means.

20 21. In a machine as claimed in Claim 1,
said cutter bed including an elongated housing located
beneath the intermediate cutters and containing
said power distribution means,
said means operably coupling the outer cutters with
25 the hydraulic motors being located externally of
said housing,
said cutter bed further including a pair of supports
fixed to and extending outwardly from opposite
ends of the housing,
30 said supports being located beneath said outer cut-
ters.

35 22. In a machine as claimed in Claim 21,
said power distribution means comprising intermeshing
gears.

23. In a machine as claimed in Claim 21,
each of said outer cutters having upright driven shaft
means rotatably supported by said support,
said means operably coupling the outer cutters with
the hydraulic motors including mechanism operably
connected to said driven shaft means.

24. In a machine as claimed in Claim 23,
each of said drive cutters having input drive shaft
means operably coupling the drive cutter with its
corresponding hydraulic motor,
said mechanism being operably connected between the
drive shaft means and the driven shaft means.

25. In a machine as claimed in Claim 24,
said mechanism including an endless, flexible drive
element entrained around said drive shaft means
and said driven shaft means.

26. In a machine as claimed in Claim 24,
said mechanism including a set of intermeshing gears.

27. In a machine as claimed in Claim 24,
said mechanism including a gear box on each of said
drive shaft means and driven shaft means,
said mechanism further including transfer shaft means
extending between the gear boxes of a drive shaft
means and a driven shaft means.

28. In a machine as claimed in Claim 14,
further including a conditioner behind said opening
for conditioning the crop materials passing
through said opening.

*Sub
a* 29. In a machine for mowing crop materials, the improvement comprising:

5 a cutter bed including a series of rotary cutters extending across the path of travel of the machine and rotatable about individual upright axes;

power distribution means below said cutters operably connecting the cutters with one another for transferring power between the cutters;

10 upright drive shaft means projecting upwardly from and operably coupled with at least one of said cutters for supplying driving power to said at least one cutter; and

15 power means for driving said cutters including at least one hydraulic motor operably coupled with ~~said upright drive shaft means.~~

~~30. In a machine as claimed in Claim 29,
said cutter bed being provided with a generally horizontally extending wall spaced above the bed,
20 said drive shaft means projecting upwardly through said wall,
said hydraulic motor being disposed above said wall.~~

25 31. In a machine as claimed in Claim 29,
there being a second upright drive shaft means projecting upwardly from and operably coupled with a second cutter in the series of cutters,
said power means including a second hydraulic motor
30 operably coupled with said second upright drive shaft means; and
conduit means establishing fluid communication between said hydraulic motors in such a manner that the
35 motors share the load of driving the series of cutters.

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32. In a machine as claimed in Claim ²⁹31,
said cutter bed having generally horizontally extend-
ing wall means spaced above the cutters having
the first-mentioned and second drive shaft means
projecting upwardly therefrom,
said first mentioned and second drive shaft means
extending upwardly through and beyond said wall
means,
said hydraulic motors being located above said wall
means.

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33. In a machine as claimed in Claim 32,
said series of cutters further including a pair of
outer cutters disposed outboard of the cutters
having said drive shaft means projecting upwardly
therefrom,
said outer cutters each having upright driven shaft
means projecting upwardly therefrom and operably
coupled therewith,
said power means including mechanism operably coupling
each drive shaft means with a corresponding
driven shaft means.

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34. In a machine as claimed in Claim ³⁶33,
said mechanism being disposed above said wall means.

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35. In a machine as claimed in Claim ³⁶33,
said machine including a crop discharge opening locat-
ed behind at least certain of the cutters in the
series,
said outer cutters and said cutters having the drive
shaft means projecting upwardly therefrom being
disposed outboard of the discharge opening at
opposite ends thereof.

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36. In a machine for mowing crop materials, the improvement comprising:

5 a cutter bed including a series of rotary cutters extending across the path of travel of the machine and rotatable about individual upright axes,

said series of cutters including a group of cutters and at least one end cutter located outboard of the group of cutters,

10 said cutter bed further including an elongated housing beneath the group of cutters and power distributing means contained within the housing for the cutters of said group,

15 said cutter bed further including a support projecting longitudinally outwardly from at least one end of the housing and disposed beneath said at least one end cutter,

said support being devoid of power distributing means therein;

20 power means for supplying driving power to the cutters of said group and including upright drive shaft means operably coupled with at least one cutter of the group;

25 upright driven shaft means operably coupled with said at least one end cutter; and

mechanism operably coupling said driven shaft means with said power means externally of the support for driving said at least one end cutter.

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30 ~~37~~³⁹. In a machine for mowing crop materials as claimed in Claim ~~36~~³⁷,

said mechanism being operably connected between said drive shaft means and said driven shaft means.

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~~38.~~ In a machine for mowing crop materials as claimed
in Claim ~~37~~,⁴⁰

5 said mechanism including an endless, flexible drive
 element entrained around said drive shaft means
 and said driven shaft means.

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~~39.~~ In a machine for mowing crop materials as claimed
in Claim ~~38~~,⁴¹

10 said drive element comprising a belt provided with
 means thereon for maintaining a synchronized
 relationship between the drive shaft means and a
 driven shaft means.

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~~40.~~ In a machine for mowing crop materials as claimed
15 in Claim ~~38~~,⁴¹

 said drive element comprising a chain capable of
 maintaining the drive shaft means and driven
 shaft means in synchronized relationship.

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~~41.~~ In a machine for mowing crop materials as claimed
20 in Claim ~~37~~,⁴⁰

 said mechanism including a set of intermeshing gears.

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~~42.~~ In a machine for mowing crop materials as claimed
25 in Claim ~~37~~,⁴⁰

 said mechanism including a gear box on each of said
 drive shaft means and driven shaft means,
 said mechanism further including transfer shaft means
 extending between said gear box.

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~~43.~~ In a machine for mowing crop materials as claimed
in Claim ~~38~~,³⁹

 said series of cutters further including at least one
 second end cutter at the opposite end of the

series from the first mentioned end cutter and located outboard of the group of cutters, said cutter bed further including a second support projecting longitudinally outwardly from a second, opposite end of the housing and disposed beneath said at least one second end cutter, said second support being devoid of power distributing means therein; upright output shaft means operably coupled with a second cutter of the group; second upright driven shaft means operably coupled with said at least one second end cutter; and second mechanism operably coupling said driven shaft means with said output shaft means externally of the second support for driving said at least one second end cutter.

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~~44~~. In a machine for mowing crop materials as claimed in Claim ~~43~~,⁴⁶

said mechanisms for the end cutters of the bed each including an endless flexible drive element.

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~~45~~. In a machine for mowing crop materials as claimed in Claim ~~44~~,⁴⁷

said flexible drive element comprising a belt provided with synchronizing means.

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~~46~~. In a machine for mowing crop materials as claimed in Claim ~~44~~,⁴⁷

said flexible drive element comprising a chain provided with synchronizing means.

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~~47.~~ In a machine for mowing crop materials as claimed
in Claim ⁴⁶~~43~~,

said mechanisms each including a set of intermeshing
gears.

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~~48.~~ In a machine for mowing crop materials as claimed
in Claim ⁴⁶~~43~~,

said mechanisms each including a pair of gear boxes
and transfer shaft means extending between the
gear boxes.

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~~49.~~ In a machine for mowing crop materials as claimed
in Claim ³⁹~~36~~,

further including means defining a crop discharge
opening behind the cutter bed for receiving crop
materials cut by the series of cutters,

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said discharge opening having a pair of opposite ends,
said group of cutters having the first and last cut-
ters of the group disposed adjacent said opposite
ends of the discharge opening,

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said first cutter of the group having said upright
drive shaft means associated therewith and said
last cutter of the group having upright output
shaft means operably coupled with the last cut-
ter,

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said series of cutters further including at least one
second end cutter at the opposite end of the
series from the first mentioned end cutter and
located outboard of the group of cutters,

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said cutter bed further including a second support
projecting longitudinally outwardly from a sec-
ond, opposite end of the housing and disposed
beneath said at least one second end cutter,

said second support being devoid of power distributing
means therein;

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second upright driven shaft means operably coupled
with said at least one second end cutter; and
second mechanism operably coupling said driven shaft
means with said output shaft means externally of
the second support for driving said at least one
second end cutter.

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50. In a machine for mowing crop materials as claimed
in Claim 49,

said first and last cutters in the group, and said
first and second end cutters, all rotating gener-
ally inwardly toward the discharge opening across
the front of the cutter bed for directing severed
crop materials toward the discharge opening.

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51. In a machine for mowing crop materials, the
improvement comprising:

a cutter bed including a series of rotary cutters
extending across the path of travel of the ma-
chine and rotatable about individual upright
axes,

said series of cutters including a group of intermedi-
ate cutters and at least a pair of end cutters
located outboard of the group at opposite ends
thereof,

said cutter bed further including an elongated housing
beneath the group of cutters and power distribut-
ing means contained within the housing for the
cutters of said group,

said cutter bed further including a pair of supports
projecting longitudinally outwardly from opposite
ends of the housing beneath said end cutters,
said supports being devoid of power distributing means
therein;

upright shaft means projecting upwardly from each of
the first and last cutters in the group;

power means operably coupled with at least one of said

5 upright shaft means for supplying driving power
to the cutters of the group;

upright driven shaft means projecting upwardly from
each of the end cutters; and

10 mechanism operably coupling said driven shaft means of
the end cutters with said shaft means of said
first and last cutters of the group externally of
the supports for driving the end cutters.

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52. In a machine for mowing crop materials as claimed
in Claim ~~51~~,⁵⁴

15 said power means including mechanically driven means
coupled with said one shaft means of the group of
cutters.

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20 53. In a machine for mowing crop materials as claimed
in Claim ~~51~~,⁵⁹

25 said power means including a pair of hydraulic motors
operably coupled with respective shaft means of
the first and last cutters of the group and means
for supplying hydraulic fluid under pressure to
said motors for operating the same.

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30 54. In a machine for mowing crop materials as claimed
in Claim ~~53~~,⁵⁶

30 said power distribution means within the housing being
operable to interconnect all of the cutters in
said group with one another in an unbroken drive
line,

35 said means for supplying hydraulic fluid under pres-
sure including conduit means communicating said
motors with one another during the application of

driving power to the shaft means of the first and last cutters of the group in a manner to cause the motors to share the load of driving all of the cutters of said group and all of the end cutters.

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~~55.~~ ⁵⁴ In a machine for mowing crop materials as claimed in Claim ~~51~~,
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said mechanism including an endless flexible drive element between each driven shaft means and its respective upright shaft means.

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~~56.~~ ⁵⁴ In a machine for mowing crop materials as claimed in Claim ~~55~~,
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said flexible drive element comprising a belt provided with synchronizing means.

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~~57.~~ ⁵⁸ In a machine for mowing crop materials as claimed in Claim ~~55~~,
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said flexible drive element comprising a chain provided with synchronizing means.

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~~58.~~ ⁵⁴ In a machine for mowing crop materials as claimed in Claim ~~51~~,
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said mechanism including a set of intermeshing gears for each driven shaft means and its respective upright drive shaft means.

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~~59.~~ ⁵⁴ In a machine for mowing crop materials as claimed in Claim ~~51~~,
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said mechanism including a pair of gear boxes and transfer shaft means for each driven shaft means and its respective upright drive shaft means.

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60. In a machine for mowing crop materials as claimed
in Claim ⁵⁹51,

further including means defining a crop discharge
opening behind the cutter bed for receiving crop
materials cut by the series of cutters,
said discharge opening having a pair of opposite ends,
said group of cutters having the first and last cut-
ters of the group disposed adjacent said opposite
ends of the discharge opening.

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61. In a machine for mowing crop materials as claimed
in Claim ⁶³60,

said first and last cutters in the group, and said end
cutters, all rotating generally inwardly toward
the discharge opening across the front of the
cutter bed for directing severed crop materials
toward the discharge opening.

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62. In a machine for mowing crop materials, the
improvement comprising:

a cutter bed including a series of rotary cutters
extending across the path of travel of the ma-
chine and rotatable about individual upright
axes;

a crop discharge opening located behind the cutter bed
for receiving severed crop materials from the
series of cutters,

said discharge opening having a pair of opposite ends,
said series of cutters including a group of intermedi-
ate cutters positioned in front of said discharge
opening with the first and last cutters of said
group being located adjacent said opposite ends
of the discharge opening,

said series of cutters further including at least a
pair of opposite end cutters located outboard of

the first and last cutters of the group and outboard of said discharge opening;

means for driving the cutters of said group in oppositely rotating pairs for directing severed material between the cutters of each pair and into the discharge opening,

the first and last cutters of the group rotating generally inwardly toward the discharge opening across the front of the cutter bed; and

means for driving the end cutters in the same direction as their next adjacent first or last cutter of the group such that the end cutters and the first and last cutters of the group all rotate generally inwardly toward the discharge opening across the front of the cutter bed.

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~~63~~. In a machine for mowing crop materials as claimed in Claim ⁶³~~62~~,

said first and last cutters of the group each being provided with upright shaft means, each of said upright shaft means being located outboard of said opposite ends of the discharge opening.

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